Volumine 2 Septembre 1953 Numero 17

IE REUNION INTERNATIONAL DE SPECTROSCOPIA MOLECULAR

SOROR Miriam Michael (director del laboratorio de recerca St. Albert al collegio Siena Heights, Adrian, Michigan, Statos Unite) ha scribite como seque super le Reunion international de spectroscopia molecular que conveniva in Paris,Francia, ab le 29 de junio al 3 de julio 1953: "Io non sape si vos recipeva un programma del reunion, sed illo esseva un gruppo multo servicial e congenial de proxime a 400 personas. Professor Lecomte esseva un hospite amicabile e perfecte. Le prime session esseva super le spectros Raman,le postmeridie de martedi esseva super le theoria, mercuridi post the esseva Hertzian, e le altere sessiones esseva dedicate alternativemente al spectros infrarubie e ultraviolette. Le arrangiamentos pro lunch in particular serviva a augmentar un intercambio libere.

Io ha justo retornate de un visita al Instituto de astrophysica del universitate Liege del qual professor P. Swings es le fortia motivante. Illes es jam in le processo de establir un laboratorio pro le region Hertzian. Illes ha le equipamento alte-dispersionic pro le spectros infrarubie, visibile, e ultraviolette -- e un esprit de corps remarcabile. Al presente illes es limitate in le personal, etc.,si que illes non pote mantener omne lor equipamento in operation diurne, sed le futuro pare plen de promissa. Il ha proxime a 10 personas qui labora in le instituto -- omnes ha a instruer in conjunction con le recerca -- e illes ha un seminario septimanal del gruppo. Io esseva impressionate per le contracto intime que cata uno de illos ha con le problemas del alteros. Il esseva un inspiration visitar les, e doctor Migeotte esseva un guida delectabile.

Nos va ab hic a Colonia e al 16te de julio io essera al Instituto de chimia physic del universitate Freiburg in Germania pro le secunde die de lor colloquio super le spectros infrarubie, le qual ha essite organisate per Professor R. Mecke.

Belgica se ha provate un pais multo delectabile e le gente impressiona nos con lor industriositate, frugalitate, e munditia. Illo es un bon placia a visitar in le estate proque illo es si fresc.Io comprende que le infantes va al schola a transverso del estate, sed si il ha un die calorose (27°C o 80°F) on da a illes lor libertate a causa del calor!"

MERCAPTANOS E HALIDOS DE BUTYLO

Professor Simão Mathias (departimento de chimia, universitate São Paulo,cassa postal 8105, São Paulo, Brasil) ha proponite un question re le mercaptanos e halidos de butylo. Ille scribeva como seque:

"In un labor super le polarisation de moleculas organic que es in progresso in iste laboratorio, un problema in spectroscopia molecular se sublevava super le qual io desira un opinion. Io recentemente publicava un articulo (J. Phys. Chem. 57, 344 (1953)) concernente le polarisationes molar de mercaptanos de propylo e butylo isomere.

Quanto on examina le spectros Raman e infrarubie del mercaptanos e halidos de butylo isomere, on vide que -- inter le quatro isomeros -- le isobutylo es le sol al qual on non ha potite ascriber un valor definite del frequentia de tender C-X (X = SH, Cl, Br, o I). Le datos que ha essite examinate es listate in K. Kohlrausch, Ramanspektren, Akademische Verlagsgesellschaft, Leipzig, 1943, 240-243, e per H.W. Thompson, J. Chem. Soc. 485 (1946).

Es possibile offerer un explication pro iste apparentemente unic situation del derivatos isobutylic?"

Forsan le lector pote inviar le responsa a professor Mathias e a iste bulletin.

IE EXEMPLO es un instructor de multo plus importantia que le precepto. Nihil es si effective in stimular un interesse in le subjecto como le enthusiasmo contagiose de un instructor qui mesme contribue in alicun parve maniera al avantiamento del scientia.

-- Mary L. Sherrill, Journal of Chemical Education 25, 512 (1948).

REGULAS DE SELECTION PRO SPECTROS VIBRATIONAL DE MOLECULAS POLYATOMIC

(continuate ab Spec. mol. 2, 35 (1953))

REGULAS DE SELECTION PRO VARIE SYMMETRIAS

LE REGULAS de selection pro multe symmetrias es date in Tabula X. Le typos que es symmetric con respecto a omne le elementos del gruppo es polarisate in le spectro Raman; omne alteres es dispolarisate.

TABULA X. Regulas de selection pro varie symmetrias.

C_1

Elementos: I.
Typos: a.
Permittite: In e Raman e infrarubie: Omne fundamentales, combinationes, e harmonicos.

C_i

Elementos: I. i.
Typos: a_g, a_u.
Permittite: In e Raman e infrarubie: nullo.
Solmente in Raman: a_g, $a_g x\ a_g$, $a_u x\ a_u$, a_g^n, a_u^n (n par).
Solmente in infrarubie: a_u, $a_g x\ a_u$, a_u^n (n impare).

C_2

Elementos: I. C_2.
Typos: a, b.
Permittite: In e Raman e infrarubie: Omne fundamentales, combinationes, e harmonicos.

$C_{1h} = C_s$

Elementos: I. σ_h.
Typos: a', a".
Permittite: In e Raman e infrarubie: Omne fundamentales, combinationes, e harmonicos.
Exemplo: $CHClBr_2$; 6 a', 3 a".

C_{2h}

Elementos: I, C_2, σ_h, i.
Typos: a_g, a_u, b_g, b_u.
Permittite: In e Raman e infrarubie: Nullo.
Solmente in Raman: a_g, b_g, $a_g x\ a_g$, $a_g x\ b_g$, $b_g x\ b_g$, $a_u x\ a_u$, $a_u x\ b_u$, $b_u x\ b_u$, a_g^n, b_g^n, a_u^n(n par), b_u^n(n par).
Solmente in infrarubie: Omne le alteres. (Regula de exclusion mutual)
Exemplo: ClOC-COCl; 5 a_g, 1 b_g, 2 a_u, 4 b_u.

C_{2v}

Elementos: I, C_2, σ_v, σ_v'.
Typos: a_1, a_2, b_1, b_2.
Permittite: In e Raman e infrarubie: a_1, b_1, b_2, $a_1 x\ a_1$, $a_1 x\ b_1$, $a_1 x\ b_2$, $a_2 x\ a_2$, $a_2 x\ b_1$, $a_2 x\ b_2$, $b_1 x\ b_1$, $b_2 x\ b_2$, a_1^n, a_2^n(n par), b_1^n, b_2^n.
Solmente in Raman: a_2, $a_1 x\ a_2$, $b_1 x\ b_2$, a_2^n(n impare).
Solmente in infrarubie: Nullo.
Exemplo: CBr_2Cl_2; 4 a_1, 1 a_2, 2 b_1, 2 b_2.

C_{3v}

Elementos: I, C_3, σ_v.
Typos: a_1, a_2, e.
Permittite: In e Raman e infrarubie: a_1, e, $a_1 x\ a_1$, $a_1 x$ e, $a_2 x\ a_2$, $a_2 x$ e, e x e, a_1^n, a_2^n(n par), e^n. Omne alteres es prohibite.
Exemplo: $H_3C\text{-}CCl_3$; 5 a_1, 1 a_2, 6 e.

C_{3h} (Per Richard B. Bernstein)

Elementos: I, C_3, σ_h, S_3.
Typos: a', a", e', e".
Permittite: In e Raman e infrarubie: e', a' x e', a" x e", e' x e', e' x e", e" x e", e'^n, e''^n.
Solmente in Raman: a', e", a' x a', a' x e", a" x a", a" x e', a'^n, a''^n(n par),
Solmente in infrarubie: a",

a'x a", a"^{n}(n impare).

C_{4v} (Per Morton J. Klein)

Elementos: I, C_2, C_4, σ_v, σ_d.
Typos: a_1, a_2, b_1, b_2, e.
Permittite: In e Raman e infrarubie: a_1, e, a_1x a_1, a_1x e, a_2x a_2, a_2x e, b_1x b_1, b_1x e, b_2x b_2, b_2x e, e x e, a_1^n, a_2^n(n par), b_1^n(n par), b_2^n(n par), e^n.

Solmente in Raman: b_1, b_2, a_1x b_1, a_1x b_2, a_2x b_1, a_2x b_2, b_1^n(n impare), b_2^n(n impare).

C_{4h} (Per W. Colner)

Elementos: I, C_4, C_2, i, S_4, σ_h.
Typos: a_g, a_u, b_g, b_u, e_g, e_u.
Permittite: Solmente in infrarubie: a_u, e_u, a_gx a_u, a_gx e_u, a_ux e_g, b_gx b_u, b_gx e_u, b_ux e_g, e_gx e_u, a_u^n(n impare), e_u^n(n impare).

Solmente in Raman: Omne alteres, excepte b_u, a_gx b_u, a_ux b_g.

C_{6h} (Per V. Ramakrishna Rao

Elementos: I, C_6, C_3, C_2, σ_h, S_6, S_3, i.
Typos: a_g, a_u, b_g, b_u, e_{1g}, e_{1u}, e_{2g}, e_{2u}.
Permittite: Solmente in infrarubie: a_u, e_{1u}, a_gx a_u, a_gx e_{1u}, a_ux e_{1g}, b_gx b_u, b_gx e_{2u}, b_ux e_{2g}, e_{1g}x e_{1u}, e_{1g}x e_{2u}, e_{1u}x e_{2g}, e_{2g}x e_{2u}, a_u^n(n impare), e_{1u}^n (n impare).

Solmente in Raman: Omne alteres, excepte b_g, b_u, e_{2u}, a_gx b_g, a_gx b_u, a_gx e_{2u}, a_ux b_g, a_ux b_u, a_u x e_{2g}, b_gx e_{1u}, b_ux e_{1g}, b_g^n(n impare), b_u^n(n impare).

C_{6v} (Per D. Levinson)

Elementos: I, C_2, C_3, C_6, σ_d, σ_v.
Typos: a_1, a_2, b_1, b_2, e_1, e_2.
Permittite: In e Raman e infrarubie: a_1, e_1, a_1x a_1, a_1x e_1, a_2x a_2, a_2x e_1, b_2x b_2, b_2x e_2, b_1x b_1, b_1x e_2, e_2x e_2, e_2x e_1, e_1x e_1, a_1^n, a_2^n(n par), b_2^n(n par), b_1^n(n par).

Solmente in Raman: e_2, a_1x e_2, a_2x e_2, b_2x e_1, b_1x e_1.

$D_2 = V$ (Per L. Isaacson)

Elementos: I, C_2^z, C_2^y, C_2^x.
Typos: a_1, b_1, b_2, b_3.
Permittite: In e Raman e infrarubie: b_1, b_2, b_3, a_1x b_1, a_1x b_2, a_1x b_3, b_1x b_2, b_1x b_3, b_2x b_3, b_1^n(n impare), b_2^n(n impare), b_3^n(n impare).

Solmente in Raman: a_1, a_1x a_1, b_1x b_1, b_2x b_2, b_3x b_3, a_1^n, b_1^n(n par), b_2^n (n par), b_3^n(n par).

$D_{2h} = V_h$

Elementos: I, C_2^z, C_2^y, C_2^x, i, σ_z, σ_y, σ_x.
Typos: a_{1g}, a_{1u}, b_{1g}, b_{1u}, b_{2g}, b_{2u}, b_{3g}, b_{3u}.
Permittite: Solmente in infrarubie: b_{1u}, b_{2u}, b_{3u}, a_{1g}x b_{1u}, a_{1g}x b_{2u}, a_{1g}x b_{3u}, a_{1u}x b_{2g}, a_{1u}x b_{3g}, b_{1g}x b_{3u}, b_{1u}x b_{2g}, b_{1u}x b_{3g}, b_{2g}x b_{2u}, b_{2g}x b_{3u}, b_{2u}x b_{3g}, b_{3g}x b_{3u}, b_{1u}^n(n impare), b_{2u}^n(n impare) b_{3u}^n(n impare).

Solmente in Raman: Omne alteres, excepte a_{1u}, a_{1g}x a_{1u}, a_{1u}x b_{1g}, b_{1g}x b_{1u}, b_{1g}x b_{2u}, a_{1u}^n(n impare).

D_{2d}

Elementos: I, C_2^z, C_2xy, S_4, σ_d,
Typos: a_1, a_2, b_1, b_2, e.
Permittite: In e Raman e infrarubie: b_2, e, a_1x b_2, a_1x e, a_2x b_1, a_2x e, b_1x e, b_2x e, e x e, b_2^n(n impare), e^n.

Solmente in Raman: a_1, b_1, a_1x a_1, a_1x b_1, a_2x a_2, a_2x b_2, b_1x b_1, b_2x b_2, a_1^n, a_2^n(n par), b_1^n, b_2^n(n par).

Exemplo: Spiropentano, C_5H_8; 5 a_1, 3a_2, 4 b_1, 5b_2, 8 e.

-ooo-

Al conclusion de iste serie, omne le parcellas essera colligite in un monographia de circa 25 paginas a un precio de $0.75.

TRADUCTION DE ARTICULOS RUSSE

CON un subvention ab le fundation national de scientia, le universitate Columbia traducera, durante le anno veniente, approximativemente 1000 paginas de articulos russe in physica, primarimente ex le Doklady Akademii Nauk, SSSR (Reportos del academia de scientias del URSS. Exemplares de illos essera disponibile ab le Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. Le precio es $0.10 pro cata un. Titulos essera annunciate in le mensual OTS Bibliography of Technical Reports e etiam in le Monthly List of Russian Accessions publicate per le Library of Congress.

BULLETINES SPECTROSCOPIC

Applied Spectroscopy. G. L. Buc, redactor, Tidewater Associated Oil Company, Bayonne, New Jersey, Statos Unite. Publicate trimestralmente, $2.00 per anno, per le Societate pro spectroscopia applicate.

British Bulletin of Spectroscopy. Sub le egide del gruppo spectroscopic industrial del instituto de physica, del gruppo spectrometric photoelectric, del gruppo de discussion infrarubie, del gruppo super methodos physic del societate de analystas public, e altere chimistas analytic. Publicate trimestralmente per le committee redactoral. Precio $1.00 per anno; abonamentos debe esser inviate a W. H. Storey, 56 Arbury Road, Cambridge, Anglaterra.

Le bulletin es dividite in duo sectiones: (1) Spectroscopia emissionic, e (2) Spectroscopia molecular. Le redactor del section emissionic es D. M. Smith, Johnson, Matthey and Company, Ltd., Wembley, Anglaterra. Le redactores del section super spectroscopia molecular es G. H. Beaven, M. R. C. Spectrographic Unit, The London Hospital, London, E. 1; e W. C. Price, King's College, London, W. C. 2.

IE COMMITTEE SUPER IE SPECTROSCOPIA INFRARUBIE

AL SYMPOSIO annual super le structura molecular e spectroscopia que conveniva al universitate Ohio State ab le 15 al 19 de junio 1953, un committee esseva eligite pro servir como portavoce pro le campo del spectroscopia infrarubie -- como representate per le lista de illos que se registra al symposios -- in le materias que require le peso del opinion del gruppo. Deberes specific del committee essera:

(1) Presentar al redactores del varie jornales le vistas del spectroscopistas re le subjecto del publication del spectros infrarubie.

(2) Cooperar con le committees que nunc existe, como per exemplo le sub-committee super le Structura molecular e spectroscopia del Concilio national de recerca e le committee E-13 del A.S.T.M. super le spectroscopia absorptionic.

(3) Discoperir le desiros del membros del gruppo in respecto al frequentia e al typo del conventiones, e servir como un puncto central pro proponimentos ab le membros individual re le interesses mutual del spectroscopistas infrarubie.

(4) Assister le departimento de physica del universitate Ohio State in le labor del symposio annual, si illo es requestate.

Le committee desira reciper proponimentos ab omne spectroscopistas infrarubie, etiam illos qui non es super le lista del previe symposios, e essayara transmitter illos con recommendationes appropriate al gruppo integre.

Membros del committee es doctores R. A. Oetjen, chef; Bryce L. Crawford, Jr.,; E. J. Rosenbaum; V. Z. Williams; e Norman Wright.

Proponimentos debe esser inviate a doctor Oetjen, departimento de physica e astronomia, universitate Ohio State, Columbus 10, Ohio, Statos Unite.

LIBROS

Spectroscopia practic. Theodore A. Cutting. Publicator, Wm. Heinemann, London, Anglaterra. 1952, 220 paginas.

Le spectroscopia. Jean Terrien. Pressas del universitate, Paris, Francia 1952, 128 paginas.

Mesurationes a un longitude de unda de un centimetro. Donald D. King. Compania D. van Nostrand, New York, N. Y., Statos Unite. 1952, 334 paginas, $5.50.

Le selection de solventes pro le spectrometria infrarubie. NRC Bulletin No.3. R. N. Jones e R. Lauzon. Consilio national de recerca, Ottawa, Canada. 1953, 18 paginas.

Communicationes al Reunion international de spectroscopia molecular (Paris, ab le 29 de junio al 3 de julio 1953), un numero special del Journal de Physique, circa 200 paginas, 3.000 francos francese. Disponibile ab professor J. Lecomte, laboratorio de recerca physic, 1 rue Victor-Cousin, Paris (5e), Francia.

Spectros molecular. I. Regulas de selection pro spectros vibrational de molecules polyatomic. Forrest F. Cleveland. Un monographia de circa 25 paginas. Precio, $0.75. Septembre o octobre 1953. Disponibile ab le laboratorio de spectroscopia, cassa postal 58, instituto technologic de Illinois, Chicago 16, Illinois, Statos Unite.

CONTRIBUTIONES FINANCIARI ADDITIONAL

Dr. Sidney I. Miller, departimento de chimia, instituto technologic de Illinois, Chicago 16, Illinois, Statos Unite.

Université de Lyon, Service de Physique Enseignement, 18 Quai Claude Bernard 18, Lyon (Rhone), Francia.

Dr. S. Mrozowski, departimento de physica, universitate Buffalo, Buffalo 14, New York, Statos Unite.

Professor Simão Mathias, departimento de chimia, universitate São Paulo, Brasil.

Senior Abram Davis, compania electrochimic Hooker, Niagara Falls, New York, Statos Unite (secunde contribution).

Dr. Glenn E. Pollard, 815 Marion Street, Denver 18, Colorado, Statos Unite.

Dr. A. L. Smith, corporation Dow Corning, Midland, Michigan, Statos Unite.

Costo de un numero de 4 paginas per lector per anno . . . . . , $1.50
Contributiones usque nunc per lector per anno $0.61

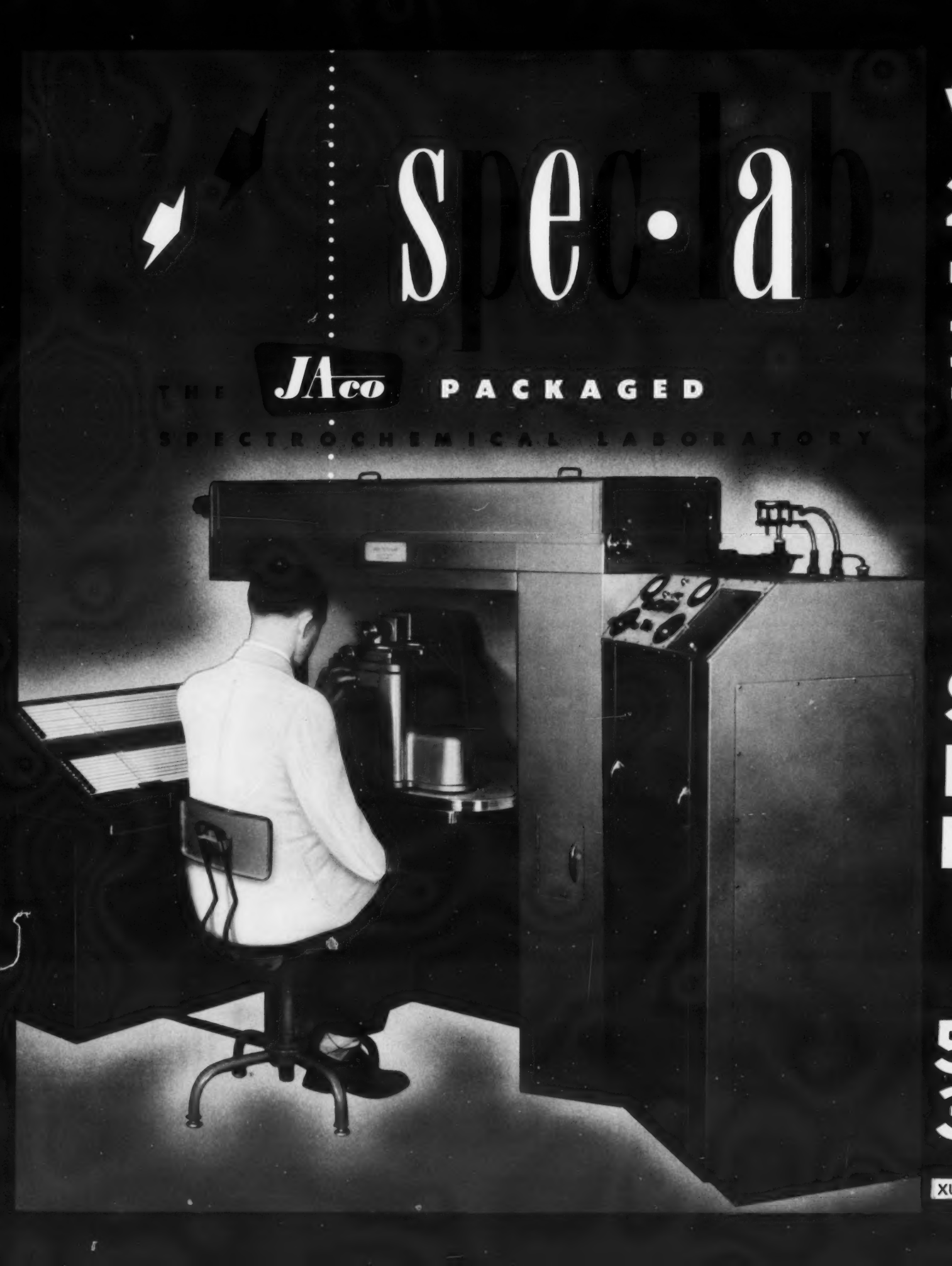
Spectroscopia molecular es publicate mensualmente in interlingua al Spectroscopy Laboratory, Illinois Institute of Technology, Chicago 16, Illinois, U.S.A. Illo pote devenir un jornal importante si illo recipe le supporto de spectroscopistas molecular. Invia summarios, novas, articulos, proponimentos, e assistentia financiari a Forrest F. Cleveland al adresse supra-indicate.

Le bulletin se basa super le conviction que illo recipera financiari contributiones voluntari -- sufficiente pro su crescimento e disveloppamento -- ab illes qui beneficia de illo, e ab alteres qui crede que isto es un projecto que merita lor supporto. Le natura e valor de numeros futur essera un mesura del validitate de iste hypothese.

Le texto original esseva legite per Dr. Alexander Gode, director del Division de interlingua de Science Service (80 East 11th Street, New York 3, N. Y.). Libros importante super interlingua es Interlingua-English Dictionary e Interlingua Grammar (Storm Publishers, New York 17).

Labor editorial es gratis. Le costo de preparation e distribution es donate per le lectores e le companias. Le director de publication es senioretta Joyce Carol Broling.

. . . . . .
.(Posta al adresse supra-indicate; face .cheques pagabile a Forrest F. Cleveland.)
. ☐ Io include $1.00 (bibliothecas $2.00) pro Spectroscopia molecular pro 1953.
. ☐ Io include $____ additional pro le disveloppamento plus rapide de illo.
. ☐ Io include $25.00 e, sub copertura separate, 500 exemplares de un pagina de information re nostre productos pro attachamento al sequente numero. (Traduction in interlingua, si desirate, gratis per Science Service.)
. ☐ Io include $2.00 pro le numeros del anno 1952.
. ☐ Io include $0.75 pro Regulas de selection pro spectros vibrational de molecules polyatomic (1953, 25 paginas).
. Nomine _____
. Adresse _____


spec·lab
THE JAco PACKAGED
SPECTROCHEMICAL LABORATORY

JAco

spec·lab

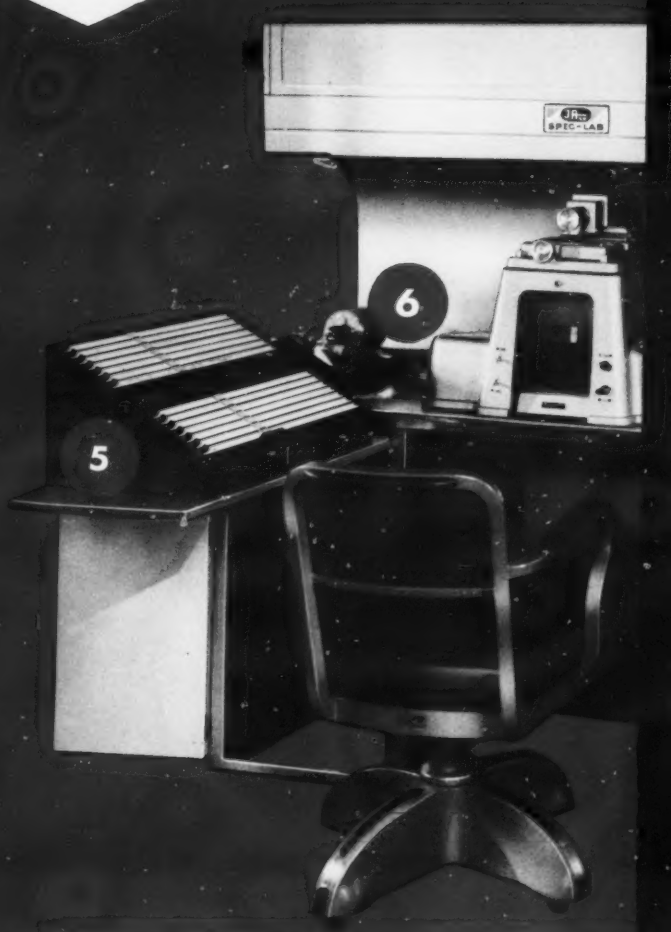
A Complete Spectrochemical Laboratory at a price you can afford

These are the instruments that fill your requirements for a compact all-in-one spectrochemical laboratory which meets exacting production control requirements yet costs only a fraction of most spectrochemical installations. *Spec-Lab* includes in only 9' x 10' of laboratory space the full complement of instruments required to perform rapid and precise analyses of all except the most complex spectra. It efficiently handles analyses of such non-ferrous alloys as aluminum, magnesium, copper base, zinc die cast and lead alloys as well as cast irons and ordinary carbon steels . . . truly the ideal instrument for reliable routine analyses at low unit cost.

The uncluttered and thoughtfully planned control layout plus the built-in ruggedness and precision of each component JAco Instrument assure foolproof operation. After only simple instruction, non-technical personnel can operate the Spec-Lab, keeping busy highly-trained analysts for more exacting work.

ASK OUR TECHNICAL SERVICES DEPARTMENT FOR HELP

JAco will be pleased to have a trained spectrochemist from our Technical Services Department visit your laboratory for the purpose of discussing with you in detail your *specific* requirements (see back page for office nearest you). These widely experienced spectrochemists can provide the answer to your most troublesome analytical problems. Write today — your inquiries will receive courteous and prompt attention.



spec·lab

SAVES TIME, TROUBLE AND DOLLARS

- **Complete** base, sourc processor, e
- **Compact** — occupied by
- **Precise** — complex sp
- **Foolproof**
- **Low Cost** to own and

Spec-Lab consists of these precision JAco Instruments

1 JACO SPEC-LAB 1.5 METER FIXED POSITION SPECTROGRAPH

An improved model of the former JAco 1.5 Meter Replica Grating Spectrograph, this instrument may be supplied with either an original or a replica grating. The concave replica, which is normally supplied, is made by a process which not only reproduces the impression of the rulings of the original grating but also retains its accuracy of figure. The grating has a ruled area of 2¼″ x 1⅜″, a 300 cm radius of curvature, 15,000 lines/inch, ruled to concentrate the light in the first and second orders ultra-violet and in the first order visible. The grating is mounted in the Wadsworth mount to provide a stigmatic image of the slit.

The spectrograph provides for a single fixed wavelength range, covering 2200-7800 A in the first order and 1800-3900 A in the second order, which is photographed on a 20″ length of film. The dispersion is constant at 10.9 A/mm in the first order or 5.45 A/mm in the second order. With a 30 micron slit, the iron triplet at 3100 A (3099.9, 3100.3 and 3100.7) can be resolved clearly in the first order.

ackaged Unit — includes grating spectrograph, supporting e, comparator microphotometer, fan scale calculator, photo-lectrode shaper.

— a complete spectrochemical laboratory in less space than two desks.

performs analyses of all materials except those with highly ectra.

— may be operated by non-technical personnel.

— low initial cost, low upkeep cost make the Spec-Lab easy operate.

A special feature for industrial users is the range of spectrum covered in a single exposure. When Eastman SA 1 film is used, the first order above 4300 A is not recorded and the second order is observed from 2100 A to 3900 A (a sufficient range for most analyses). With *both* orders recorded in one exposure, your work is simplified and special techniques not possible on other spectrographs can often be utilized. An example of the advantages of this feature is found in the analysis of aluminum alloys. Here two standard aluminum lines nearly equal in transmission (order I 2669.2 A and order II 2652.5 A) may be used making it unnecessary to microphotometer Al 3059.9 A. This eliminates the use of a high level arc line which has been known to contribute to severe analytical working curve shifting even though the changes in spark unit parameters are small.

For exposure control, the spectrograph is provided with an electromagnetic shutter operated by the timers of the source unit. The manually racked filmholder makes possible as many as 24 one millimeter exposures on a single strip of film.

Direct accessories include an accessory bar, condensing lens, and stepped sector or filter assembly for film calibration. A Petrey spark stand with safety enclosure is supplied with an upper electrode holder for use when it is desired to employ pin type specimens.

The spectrograph base serves as a mounting table for the microphotometer and is equipped with a shelf and storage compartment.

2 JACO SPEC-LAB ARC-SPARK SOURCE UNIT

This source unit, designed specifically for the type of analytical work for which the 1.5 meter spectrograph is intended, consists of a 30,000 peak voltage ac spark circuit and a low voltage continuously ignited ac arc.

The 110 v continuously ignited ac arc is particularly useful for survey qualitative analyses and for the quantitative determination of very low concentration impurities. It is especially suited to the analysis of liquids and solutions which are conveniently evaporated on the surfaces of flat-topped graphite electrodes. In the analysis of metals, elements in concentrations of a few parts per million to about 0.1% are often determined with this source. In these cases it is used either to shorten exposures or to obtain the required sensitivity. The arc is adjustable from approximately 1 to 5 amp to provide ready adaptation to the type of sample being analyzed.

The ac spark circuit permits selection of those electrical parameters required by the samples under analysis. It is also used in analyses where two sets of spark excitation conditions must be adopted in order to determine both alloy elements and impurity elements. For example, while zinc base alloys are generally excited with a low inductance spark to give the required accuracy and precision for aluminum and magnesium, the trace metals and copper are *better* determined using a high inductance spark. A suitably tapped inductance coil in the spark circuit provides for such contingencies.

To provide additional flexibility in dealing with a diversity of sample types, the Spec-Lab Source makes provision for the easy selection of either a .005 or .010 microfarad capacitance.

The control panel includes a preburn and exposure timer, ac and rf ammeters, excitation selector switch, start and stop buttons, indicator lights, primary voltage powerstat control, and capacitance and inductance selectors. The source has been especially designed to minimize error by simplifying adjustments and controls, yet it provides a sufficient range for a wide variety of excitation conditions. Special training in the analytical techniques which have been developed using the Spec-Lab Source is given during the installation and instruction period — a service provided at no additional cost by JAco.

3 JACO SPEC-LAB 35MM FILM COMPARATOR MICROPHOTOMETER

Providing rapid interpretation of spectrograms, this specially designed instrument functions both as a comparator for qualitative analysis and as a microphotometer for quantitative determinations. As a comparator, it performs rapid qualitative analysis by placing the image of a master film in juxtaposition with the image of the sample film. Observation of the coincidence of the labeled spectrum lines of the master film with lines of the sample film serves as a quick and simple method of identifying the spectrum lines and therefore the elements in the sample being analyzed. Both the master and the sample films are projected to a 10X magnification, making careful observation possible without eyestrain or

undue visual effort. An 18 mm diameter area of both films is projected — sufficient for ready recognition of the characteristic patterns of the reference iron spectrum and to permit easy interpolation between known lines.

Quantitative analyses require a precise measurement of the transmission of the spectrum lines, and the Spec-Lab Film Microphotometer makes possible as many as four readings each minute to a precision of $\pm\frac{1}{2}\%$. Measurements are made by a system which includes a fixed width photocell slit, barrier layer photocell, and a high speed, sensitive galvanometer which is fully shock mounted. The galvanometer spot is projected across a fixed 20 cm scale, graduated into 200 divisions reading 0 to 100, which is located immediately above the projected spectra. The standard 120μ x 7 mm entrance slit is suitable for microphotometering spectrum lines which are taken with a spectrograph slit which is 30 or 50 microns wide by 0.9 mm high. Other fixed slits can be supplied on special order.

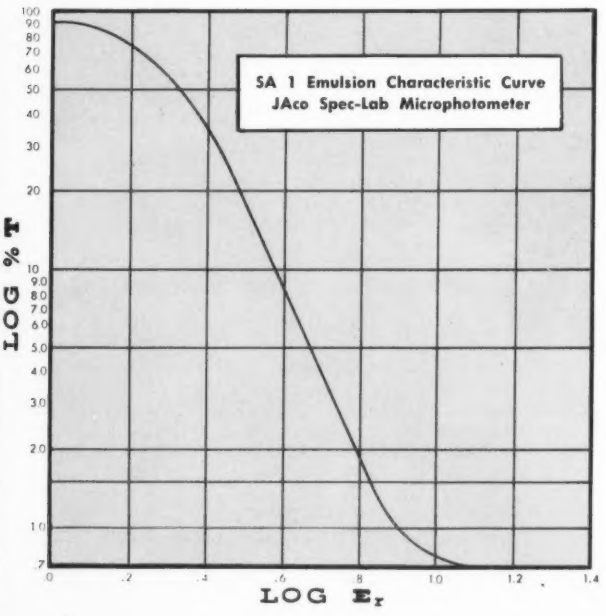
Adjustments on the Spec-Lab Film Microphotometer include the zero set, sensitivity control, individual and combined film feed knobs, manual cross motion, rotation for alignment of the spectrum with the slit, and a motor scan for reading the transmission of the lines. The rate of scan is 80 microns in fifteen seconds, at the end of which period the instrument automatically returns to the start position.

Careful attention has been given to the optical design of the microphotometer, especially in regard to the elimination of the Schwarzchild-Villiger effect (scattered light). This effect is most easily detected by the departure from a straight line of the emulsion characteristic curve (H & D curve) at low transmission values. The graph shows a typical curve measured on the JAco film microphotometer. Note that the curve remains straight considerably below the transmission range possible to employ in spectrochemical analysis.

Closely related to the importance of good optical design is the mechanical arrangement for consistently holding the film in the focal plane. JAco designers accomplished this by bringing the film across the top side of the pre-slit which is focused on the entrance slit of the microphotometer.

This JAco Film Microphotometer, which has been designed especially for the Spec-Lab, offers in a lower cost instrument the accuracy and speed obtained in densitometers selling at almost double the price. It is the most compact microphotometer commercially available occupying less than 2′ x 2′ of table space. For operator comfort and convenience, the spectra and galvanometer scale are viewed directly in front of the seated operator, much as in reading a book. Operation is troublefree and because a barrier layer cell is used, there are no electronics to cause maintenance headaches.

The instrument is supplied with a voltage regulating transformer, input 110 v, 60 cycles, single phase, 100 watts.



4 JACO SPEC-LAB PHOTOPROCESSOR

This is a compact, self-contained unit for developing, fixing, washing, and drying spectrograms in routine spectrochemical analysis where emulsions must be processed with extreme uniformity for quantitative measurements. The unit contains tanks for developer, stop bath, fixer, and wash.

The tanks for developer and fixer are immersed in a water bath which is thermostatically controlled to maintain a temperature constant to ¼°. The temperature can be set over the range 68° - 75°F. The solutions in both the developer and fixer tanks are agitated with a completely non-laminar flow across the face of the emulsion — a method specially developed by JAco. The tanks hold one-half gallon of solution and are designed to expose only a small surface of solution to air to reduce developer oxidation. In the wash tank, a turbulent flow of water across the film results in rapid elimination of hypo from the emulsion.

A dryer compartment at the top of the unit provides radiant heating through the back of the film and a hot air blast across the emulsion face.

Mounted on the photoprocessor is a timer with alarm which is set to signal when the development has been completed.

The unit operates from a 110 v, 60 cycle, power line. Normal tap water is used for the wash tank, and a supply of cold water from a bubbler such as the JAco 3400 or 3401 (not included with the Spec-Lab) is required to furnish approximately 5 gallons an hour of water at 50°F.

For complete description see Catalogue P-1-53.

5 JACO SPEC-LAB FAN SCALE CALCULATOR

In spectrochemical analysis, it is desirable to translate as quickly as possible the data obtained on the microphotometer into terms of percent composition. By usual methods, this involves the lengthy procedure of plotting an emulsion characteristic curve from data obtained by the microphotometry of a stepped pattern exposed on the film for this purpose. The transmission values for both the internal standard and the analysis line must be converted by the use of this curve into relative intensity values. A ratio of relative intensities is then taken and related to percent composition.

However, when the Spec-Lab Fan Scale Calculator is used all of these steps are accomplished simply and quickly. It eliminates the necessity for drawing the individual characteristic curve, functions as a slide rule in the calculation of the ratio of relative intensities, and makes possible the direct reading of the percent composition off a pre-determined working curve strip.

The Fan Scale itself actually comprises a whole family of characteristic curves for the emulsion being used. Vertical movement of the fan scale automatically selects the appropriate characteristic curve for any development and wavelength region. In addition to speeding calculations, the Fan Scale also offers a means for easy and rapid checks on development which are reflected in increased accuracy of quantitative analytical results.

The Spec-Lab Fan Scale Calculator is equipped with the fan scale for SA 1 emulsion, which is the emulsion normally used in the metallurgical field. However, fan scales of other types are available on special order for a variety of emulsions.

For complete description see Catalogue C-1-53.

6 JACO SPEC-LAB CARBON ELECTRODE DRILLER

This device provides a means for rapidly pointing counter electrodes or for drilling craters for samples in lower electrodes. To operate, the carbon or graphite rod is merely pushed into the driller, removed, the prepared tip broken off to the desired length, and the rod again reinserted for drilling next electrode. The driller supplied with the Spec-Lab includes collets for both regular and special pure ¼" electrodes, plain crater drill, length gauge, and pointers for 60° hemispherically tipped points and 120° cones. Interchangeable collets and tools are available on special order to accommodate rods of different diameters and to provide different shapes of electrodes.

For complete description see Catalogue D-1-53.

spec·lab

INSTALLATION & INSTRUCTION

When you purchase a Spec-Lab, the services of a competent installation engineer and trained spectrochemist are furnished without cost for a period of one week. This skilled JAco technologist will connect and adjust the complete assembly and instruct your personnel in the proper use of the instruments and accessories on the analytical problems with which your laboratory is concerned. The spectrochemist is available at a nominal charge for additional instruction if desired.

Instruction books, complete in every detail, are supplied with each instrument. Literature covering suggested analytical techniques are also included, and users receive regularly reports containing helpful data obtained in the JAco laboratory and from users of JAco equipment.

OTHER FINE JAco INSTRUMENTS

JACO 3.4 METER STIGMATIC GRATING SPECTOGRAPH

JACO VARISOURCE

JACO RECORDING COMPARATOR MICROPHOTOMETER

JAco **JARRELL-ASH COMPANY**

26 FARWELL ST., NEWTONVILLE, MASS.

SALES OFFICES:

DETROIT	EL CERRITO, CAL.	CHATTANOOGA	QUEENS VILL., N.Y.
13680 Capital Ave.	1344 Devonshire Drive	1431 Broad Street	8056 - 230th St.

NEW ADVANCE IN QUANTOMETRY

ARL Industrial Research Quantometer Shows New Versatility

Greatly Improved IRQ* Hailed As Most Flexible Direct-Reading Instrument Available

The new, flexible IRQ provides industrial laboratories with a means of quantitatively measuring a large number of elements simultaneously in a few minutes. It thus allows analytical research and control heretofore considered impossible. By incorporating movable and fixed receivers, any of the elements amenable to spectrochemical analysis can be measured with complete flexibility as to choice and order and with little restriction as to number. This versatility of the IRQ permits high speed analysis of all types of materials. For example, the unit is capable of giving an accurate chemical analysis of such widely diversified materials as high and low alloy steels, pig or cast irons, aluminum, zinc, lead and copper base alloys, minerals, ores and biological and pharmaceutical substances.

Automatic pen recording provides duplicate copies of the analyses on direct-reading charts during the few minutes required to complete the operation.

A unitized type of construction provides great accessibility and serviceability and allows quick changes to be made in the elements, the concentrational ranges, and the recording order of interest.

The speed, accuracy and flexibility of the IRQ makes it a "must" for every really well-equipped laboratory. Under actual operation, it will quickly return its cost by extending analytical research and control at greatly reduced expense.

WANT MORE INFORMATION? MAIL THE COUPON TODAY!

*Trade Mark

The ARL line includes Production Control Quantometers*, 1.5 and 2-meter Spectrographs, Precision Source Units, Raman Spectrographs and related accessories.

Applied Research Laboratories

SPECTROCHEMICAL EQUIPMENT

3717. PARK PLACE GLENDALE 8, CALIFORNIA

NEW YORK • PITTSBURGH • DETROIT • CHICAGO • DALLAS • LOS ANGELES • LAUSANNE, Switzerland

☐ Send more information on the IRQ
☐ Send a complete catalogue of the ARL spectrochemical instrument line

Name_____

Company_____

Address_____

City_____ State_____

Reprint of Advertisement appearing in National Publications

Prepared by WILLARD G. GREGORY & COMPANY, *Advertising Agency*

facts on Infrared *for the laboratory*

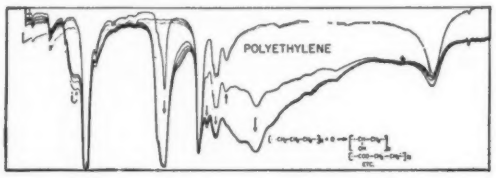
Want to watch a reaction?

Reaction rates, effects of catalysts, temperature, etc., the detection of intermediates, efficiency of stabilizers, aging properties of materials—these are all subjects of importance in the study of reaction mechanisms. Special infrared analytical techniques reveal valuable information about all of them.

The composite spectrum below depicts the oxidation reaction of polyethylene. The formation of hydroxyl and carbonyl groups is indicated by the gradual appearance of their characteristic absorption bands as the oxidation proceeds. The hydroxyl absorption band later decreases in intensity with the appearance of the carbonyl or peroxide stage.

The spectrum was prepared by means of the unique cycling feature of the Perkin-Elmer Model 21 Infrared Spectrophotometer and a Perkin-Elmer horizontal heated sampling stage. A sample of polyethylene was placed on the stage and heated to 150° C for 4 hours. Its spectrum was successively traced with no attention from the operator.

"Recording a reaction" is just one example of how a versatile infrared spectrophotometer plus the availability of the proper accessories can be invaluable in the solution of common laboratory problems. *Only* at Perkin-Elmer will you find all the instruments and accessories required to meet *all* research needs.



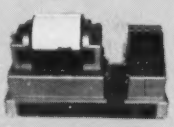
The Perkin-Elmer Corporation, 860 Main Avenue, Norwalk, Conn.
Southern Regional Office: New Orleans, Louisiana

For Optical Design and Electro-Optical Instruments

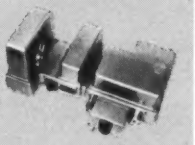
PERKIN PE ELMER

The ONLY complete range of infrared instruments and accessories to meet all research needs!

Model 112 Double Pass Infrared Spectrometer—single beam, high resolving power, excellent for structural analysis. Suitable attachments for all spectral ranges. *Write for Bulletin 102.*



Model 21 Double Beam Infrared Spectrophotometer—The fastest and most efficient instrument commercially available for the recording of large numbers of spectra. Records directly in percent transmission. *Write for Bulletin 104.*



Model 13 Ratio Recording Infrared Spectrophotometer—Records double or single beam with many features of both the Model 112 and 21. Ideal for the small laboratory with a wide variety of problems. *Write for Bulletin 110.*

ACCESSORIES:

Demountable Cell—may be assembled to any thickness—for liquids, capillary films, mulls of solids—and films and powders.

Fixed Thickness Liquid Cell—for nearly all liquids and solution work. Standard thickness between 0.025 and 1 mm—others to order.

Standard Gas Cells—2, 5, 10 cm and 1 and 10 m path lengths for various absorption studies.

Microcell—obtains good spectra with 25-100 micrograms—available in thicknesses from 0.025 to 3 mm.

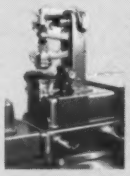
Variable Space Liquid Cell—has accurately variable path length of 0 to 5 mm to bring out features of a spectrum and to compensate for solute absorption in double beam spectrometry.

Reflectance Attachment—for specular reflectance studies of solid materials.

Pressure Cells—for liquids or gasses; path lengths from 0.025 to 50 mm, pressures up to 300 psi. Useful in trace absorption or overtone work. Long and short sizes.

Heating Stage and Heating Stage Power Supply—used with above attachment; permits heating to about 300° C. For studying polymerizations and oxidations. Cycling feature of the Model 21 automatically records reaction stages taking place.

Polarizer—for studies of crystal and molecular orientations. Rotable Cell—To assist in sample orientation for polymerization studies.



Microscope—For analysis of samples of few microns in size as single fibers, tissues, crystals, etc.

Write for Product Bulletin A-3 for more information about these accessories.